

CLAIMS

1. A method of operating a MALDI mass spectrometer to analyze a MALDI sample, the method comprising the steps of:

generating a laser beam, and

5 operating a laser steering assembly to move the focus of the laser beam over the MALDI sample.

2. The method of claim 1, wherein:

the laser steering assembly comprises a mirror array, and

10 the operating step comprises operating the mirror array to move the focus of the laser beam over the MALDI sample.

3. The method of claim 2, wherein:

the mirror array comprises (i) an X-mirror for controlling position of
15 the focus of the laser beam on the MALDI sample along an X-axis, and (ii) a Y-mirror for controlling position of the focus of the laser beam on the MALDI sample along a Y-axis, and

operating the mirror array to move the focus of the laser beam over the MALDI sample comprises adjusting position of the X-mirror and the Y-mirror so as
20 to move the focus of the laser beam over the MALDI sample.

4. The method of claim 1, wherein the MALDI sample is held stationary during the operating step.

5. The method of claim 1, wherein the operating step comprises operating the laser steering assembly so as to advance the focus of the laser beam in a logarithmic spiral pattern over the MALDI sample.

5 6. The method of claim 1, wherein:
the laser steering assembly comprises a mirror array comprising (i) an X-mirror for positioning the focus of the laser beam on the MALDI sample along an X-axis, and (ii) a Y-mirror for positioning the focus of the laser beam on the MALDI sample along a Y-axis,

10 the operating step comprises adjusting position of the X-mirror and the Y-mirror so as to move the focus of the laser beam over the MALDI sample in a predetermined pattern.

7. The method of claim 6, wherein the predetermined pattern
15 comprises a logarithmic spiral pattern.

8. The method of claim 1, wherein the operating step comprises operating the laser steering assembly so as to advance the focus of the laser beam in a geometric pattern over the MALDI sample.

9. A MALDI mass spectrometer, comprising:

a laser source,

a laser steering assembly, and

a processing unit electrically coupled to the laser source and the laser

5 steering assembly, the processing unit comprising (i) a processor, and (ii) a memory device electrically coupled to the processor, the memory device having stored therein a plurality of instructions which, when executed by the processor, causes the processor to:

(a) operate the laser source to generate a laser beam, and

10 (b) operate the laser steering assembly to move the focus of the laser beam over a MALDI sample.

10. The MALDI mass spectrometer of claim 9, wherein:

the laser steering assembly comprises a mirror array, and

15 the plurality of instructions, when executed by the processor, further cause the processor to operate the mirror array to move the focus of the laser beam over the MALDI sample.

11. The MALDI mass spectrometer of claim 10, wherein:

20 the mirror array comprises (i) an X-mirror for positioning the focus of the laser beam on the MALDI sample along an X-axis, and (ii) a Y-mirror for positioning the focus of the laser beam on the MALDI sample along a Y-axis, and

the plurality of instructions, when executed by the processor, further cause the processor to operate the mirror array to adjust position of the X-mirror and
25 the Y-mirror so as to move the focus of the laser beam over the MALDI sample.

12. The MALDI mass spectrometer of claim 9, further comprising a sample stage, wherein the sample stage is held stationary during operation of the laser steering assembly.

5 13. The MALDI mass spectrometer of claim 9, wherein the plurality of instructions, when executed by the processor, further cause the processor to operate the laser steering assembly so as to advance the focus of the laser beam in a logarithmic spiral pattern over the MALDI sample.

10 14. The MALDI mass spectrometer of claim 9, wherein:
the laser steering assembly comprises a mirror array comprising (i) an X-mirror for positioning the focus of the laser beam on the MALDI sample along an X-axis, and (ii) a Y-mirror for positioning the focus of the laser beam on the MALDI sample along a Y-axis,

15 the plurality of instructions, when executed by the processor, further cause the processor to operate the mirror array to adjust position of the X-mirror and the Y-mirror so as to move the focus of the laser beam over the MALDI sample in a predetermined pattern.

20 15. The MALDI mass spectrometer of claim 14, wherein the plurality of instructions, when executed by the processor, further cause the processor to operate the mirror array to adjust position of the X-mirror and the Y-mirror so as to move the focus of the laser beam over the MALDI sample in a logarithmic spiral pattern.

16. The MALDI mass spectrometer of claim 9, wherein the plurality of instructions, when executed by the processor, further cause the processor to operate the laser steering assembly so as to advance the focus of the laser beam in a geometric pattern over the MALDI sample.

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17. A MALDI mass spectrometer, comprising an electronically-controlled mirror array operable to move the focus of a laser beam over a MALDI sample.

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18. The MALDI mass spectrometer of claim 17, wherein the mirror array comprises:

an X-mirror operable to move the focus of the laser beam over the MALDI sample along an X-axis, and

a Y-mirror operable to move the focus of the laser beam over the
15 MALDI sample along a Y-axis.

19. The MALDI mass spectrometer of claim 17, further comprising a laser source and a sample stage configured to support the MALDI sample, wherein the mirror array is interposed between the laser source and the sample stage.